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### Thermal Relief Pad

A special pattern etched around a via or a plated through-hole to connect it into a power or ground plane. A thermal relief pad is necessary to prevent too much heat being absorbed into the power or ground plane when the board is being soldered.

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### Thermal Tracking

Typically used to refer to the problems associated with optical interconnection systems whose alignment may be disturbed by changes in temperature.

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### Thick-Film Process

A process used in the manufacture of hybrids and, to a lesser extent, multichip modules in which signal and dielectric (insulating) layers are screen-printed onto the substrate.

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### Thin-Film Process

A process used in the manufacture of hybrids and multichip modules in which signal layers and dielectric (insulating) layers are created using opto-lithographic techniques.

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Through-Hole (see Lead Through-Hole, Plated Through-Hole, and Through-Hole Via)

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### Through-Hole Via

A via that passes all the way through the substrate.

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### Thru-Hole

A commonly used abbreviation of "through-hole".

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### Time-Of-Flight

The time taken for a signal to propagate from one logic gate or opto-electronic component to another.

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### Tin-Lead Plating

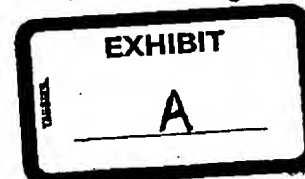
An electroless plating process in which exposed areas of copper on a circuit board are coated with a layer of tin-lead alloy. The alloy is used to prevent the copper from oxidizing and provides protection against contamination.

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### Tinning

An abbreviation of *tin-lead plating*, which is an electroless plating process in which exposed areas of copper on a circuit board are coated with a layer of tin-lead alloy. The alloy is used to prevent the copper from oxidizing and provides protection against contamination.

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## Technical Glossary

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### Tag RAM

An integral component in a cache RAM subsystem that is sometimes integrated into the chip to meet critical timing requirements.

### TCXO

Acronym used to describe a Temperature Compensated Crystal Oscillator.

### Telecom Modular Jacks/Plugs

Usually a board mounted receptacle which accepts a data and voice transmission.

### Temperature Characteristic (TC)

The change of capacity with changing temperature. Typically expressed in units of percent of capacity per degree Celsius, or maximum percent change over the operating temperature range. An ultra-stable ceramic capacitor is referred to as NPO (Negative Positive Zero), stable is referred to as X7R, and general purpose is referred to as Z5U or Y5V.

### Temperature Coefficient (TC)

The change of resistance with changing temperature. Typically expressed in units of percent change of resistance per degree Celsius, or maximum percent change over the operating temperature range. Standard TC for resistors is 100 ppm.

### Tera

A prefix that represents 1,000,000,000,000 or a million million.

### Terminal Blocks

A Terminal Block joins the PC board to other subassemblies within a cabinet or to the case itself.

### Test Harness

Also known as a test bench in VHDL circles and a test fixture in Verilog. A test harness is a model used to verify the correctness of the hardware model being tested - usually with the same HDL as the hardware model.

### Thermal Derating

The percent decrease in hold current necessary at increased temperature.

### Thermistors

Ceramic-based resettable devices.

### Thick Film Process

The method of manufacturing passive components in which circuits are formed by screen

resistor paste onto a ceramic substrate.

#### **Thin Film Process**

The method of manufacturing networks or chip resistors by depositing thin layers of material to perform the electrical function of a resistive element. Is best used when tighter tolerance and better temperature coefficients are needed.

#### **Throughput**

A general term referring to how fast data can be processed or transferred.

#### **Throws**

Number of circuits that can be controlled by any one pole of a switch. Example: In a single throw (SPDT) switch, only one circuit may be completed at a time. However, the possible circuits (throws) that can be made.

#### **Time Constant (Timing)**

A capacitor application where close tolerance is usually required. When used in conjunction with a resistor and an integrated circuit, the output is "pulsed" at even intervals. The capacity is one of the variables in determining the distance.

#### **Timing Simulation**

Utilized when designing PLDs, this process searches for signals that are getting to their inputs later than they are supposed to, subsequently causing a delay and incorrect logic in the circuit. Timing simulation also checks the behavior and circuit timing delays, making sure the device can run as fast as the engineer requires. This simulation is conducted most often on FPGAs due to their less predictable delays and complex circuitry.

#### **TNC Connector**

A box to box connector with a bayonet-style coupling like the BNC, but with threaded center conductor.

#### **Tolerance**

Usually applies to the extent from which the actual capacity reading may vary from the capacity value when it is actually tested.

#### **Topology**

Refers to the architecture used to connect the nodes of a network. The two most common are Bus and Ring.

#### **Transformer**

An electronic device that converts current variations in primary voltage into variations of voltage and current in a secondary circuit.

#### **Transguard**

Multi-layer, transient voltage suppressors.

#### **Trimmers**

A type of variable resistor that is PC board-mounted. They are intended to be adjusted at the time of manufacture and then left alone.

#### **Trip Current (switching current) (It)**

The minimum current at which the device will surely trip; usually twice the hold current.

#### **TRU**

Acronym used to describe a Timing Recovery Unit. This is a type of frequency control device that has the ability to recover sparse data patterns by extracting the clock signal from a digital stream and regenerates the data. It reduces the need for data encoding.

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- Transfer Function*
- \* **TFBGA**  
*Thin Fine pitch Ball Grid Array*  
Height 1.2 max, pitch less than 1.0 mm.
  - \* **TFD**  
*Thin Film Detector*
  - \* **TFEL**  
*Thin Film Electro Luminescent*
  - \* **TFT**  
*Thin Film Transistor*
  - \* **Tg**  
*Glass Transition Temperature*  
Temperature where the expansion rate of a material increases.
  - \* **TGAI**  
*Technical Grade of the Active Ingredient*
  - \* **TGO**  
*Total Gross Output*
  - \* **TGP**  
*Technical Grade Product*
  - \* **TGM**  
*Total Gas Management*
  - \* **T/H**  
*Track and Hold*
  - \* **THB**  
*Temperature Humidity Bias*  
A reliability test for semiconductor devices. Parts to be tested are operated in a high temperature, high humidity environment, simulating years of normal use in a few hundreds of hours.
  - \* **THC**  
*Total Hydrocarbons*
  - \* **THD**  
*Total Harmonic Distortion*
  - \* **Thermal Compression Bonding**  
A method of wire bonding that does not use an intermediary metal or melting, but rather the plastic flow of materials resulting from the combination of heat and pressure. Also called *thermocompression bonding*.
  - \* **Thermal Diffusion**  
*See Diffusion*
  - \* **Thick-Film Process**  
A hybrid microelectronic process where conductors, insulators and passive components are screened from special pastes onto a substrate. This process is less expensive than the thin-film process, which uses depositions and photolithography techniques to define conductors, etc.
  - \* **Thin-Film Process**  
The use of deposited films of conductive or insulating material, which may be patterned to form electronic components and conductors on a substrate, or used as insulation material between successive layers of components.
  - \* **THMs**  
*Trihalomethanes*
  - \* **Threshold**  
The input voltage at which the output logic level changes state.
  - \* **THz**  
*TetraHertz*
  - \* **TIC**  
*Total Inorganic Carbon*
  - \* **TIG**  
*Tungsten Inert Gas*
  - \* **Timekeeper**  
ST Trademark for NVRAM with battery and RTC.
  - \* **TIN**  
*Temporary INstruction*
  - \* **TINA**  
*Telecommunication Integrated Network Architecture*
  - \* **TIS**  
*Traceability Information System*
  - \* **TISE**  
*Take It Somewhere Else*
  - \* **TJ**  
*TeraJoule*
  - \* **TLV**  
*Threshold Limit Value*  
Airborne concentration of a gas or particle to which most workers can be exposed on a daily basis for a working lifetime without suffering adverse effects.
  - \* **TLV-CTLV**  
*Ceiling*
  - \* **TLV-STEL**  
*TLV-Short Term Exposure Limit*